

**I CLAIM:**

1. In a data-over-cable system, a method for optimizing data throughput on an upstream channel at a target packet error ratio, the upstream channel providing data transmissions from a plurality of cable modems to a cable modem termination system, the method comprising the

5 steps of:

ascertaining a signal-to-noise ratio on the upstream channel;

determining parameters for data transmissions by the cable modems on the upstream channel, wherein the determined parameters are associated with the signal-to-noise ratio and the target packet error ratio; and

10 negotiating the use of the determined parameters in the upstream channel.

2. A computer readable medium having stored therein instructions for causing a central processing unit to execute the method of Claim 1.

15 3. The method of Claim 1 wherein the target packet error ratio is selected by a user.

4. The method of Claim 1 wherein the target packet error ratio is a default value.

5. The method of Claim 1 wherein the ascertaining step is performed on the cable modem  
20 termination system.

6. The method of Claim 1 wherein the ascertaining step comprises:

scheduling a plurality of quiescent periods on the upstream channel wherein no data is transmitted by the cable modems on the upstream channel;

measuring a noise floor value on the upstream channel during one of the quiescent

5 periods; and

converting the measured noise floor value to the signal-to-noise ratio.

7. The method of Claim 1 wherein the ascertaining step comprises:

scheduling a plurality of quiescent periods on the upstream channel wherein no data is

10 transmitted by the cable modems on the upstream channel;

measuring noise floor values on the upstream channel during the quiescent periods;

averaging the measured noise floor values to obtain an average noise floor value; and

converting the average noise floor value to the signal-to-noise ratio.

15 8. The method of Claim 1 wherein the determining step comprises:

ascertaining a payload size for a data transmission;

reading the parameters for the data transmission on the upstream channel from a table, wherein the determined parameters in the table are associated with the signal-to-noise ratio, the target packet error ratio, and the payload size.

20 9. The method of Claim 8 further comprising the step of predetermining the table entries.

10. The method of Claim 9 wherein the step of predetermining the table entries for a given payload size comprises the steps of:

generating all combinations of parameters and signal-to-noise ratios;

calculating a packet error ratio and data throughput for each combination; and

5 determining whether the calculated packet error ratio for the combination is less than the target packet error ratio, and if so,

determining whether the data throughput for the combination is the greatest, and if so,

creating the entry in the table comprising the value of the generated signal-to-noise ratio for the combination, the target packet error ratio, and the generated parameters for the combination.

11. The method of Claim 10 wherein the step of calculating the packet error ratio for the combination comprises the steps of:

calculating a bit error ratio for the combination;

15 converting the bit error ratio to a byte error ratio for the combination;

converting the byte error ratio to a codeword error ratio for the combination; and

converting the codeword error ratio to the packet error ratio for the combination.

12. The method of Claim 1 wherein the determined parameters are also associated with a payload size for a data transmission from one cable modem.

13. The method of Claim 12 wherein the determined parameters are selected from a group consisting of symbol rate, modulation type, or error correction levels.

14. The method of Claim 13 wherein the modulation type is a Quadrature Amplitude Modulation type.

15. The method of Claim 13 wherein the error correction levels are selected from a group consisting of Forward Error Correction level or Forward Error Correction data coverage size.

16. The method of Claim 1 wherein the negotiating step comprises:

building an Upstream Channel Descriptor message based on the determined parameters;

and

sending the Upstream Channel Descriptor message to the cable modems.

17. The method of Claim 1 further comprising:

reconfiguring the cable modems to transmit data according to the determined parameters.

18. The method of Claim 1 further comprising:

recognizing a substantial variance in the signal-to-noise ratio;

ascertaining whether the variance in the signal-to-noise ratio is consistent over a given number of transmission cycles, and if so,

determining new parameters for data transmission on the upstream channel, wherein

the new parameters are associated with the variance in the signal-to-noise ratio; and

negotiating the use of the new determined parameters in the upstream channel.

19. The method of Claim 1 further comprising:

measuring a payload size for a selection of data transmissions on the upstream channel,  
wherein the upstream channel comprises a plurality of data transmissions;

recognizing a substantial variance in the payload size;

ascertaining whether the variance in the payload size is consistent over a given number of  
transmission cycles, and if so,

determining new parameters for data transmission on the upstream channel, wherein  
the new parameters are associated with the variance in the payload size; and

negotiating the use of the new determined parameters in the upstream channel.

20. The method of Claim 19 wherein the selection of data transmissions is associated  
with a single Interval Usage Code.

21. The method of Claim 1 further comprising:

measuring a packet error ratio for a selection of data transmissions on the upstream  
channel;

recognizing a substantial variance in the measured packet error ratio without a  
corresponding change in the signal-to-noise ratio or a payload size for a selection of data  
transmissions;

ascertaining whether the variance in the measured packet error ratio is consistent over a  
given number of transmission cycles, and if so,

adjusting a Forward Error Correction level of the data transmission to compensate for  
the variance.

22. The method of Claim 21 wherein the selection of data transmissions is associated with a single interval usage code.

23. In a data-over-cable system, a method for optimizing data throughput on an upstream channel at a target packet error ratio, the upstream channel providing data transmission from a plurality of cable modems to a cable modem termination system, the method comprising the steps of:

scheduling a plurality of quiescent periods on the upstream channel wherein no data is transmitted by the cable modems on the upstream channel;

measuring a noise floor value on the upstream channel during at least one of the quiescent periods;

converting the measured noise floor values to a signal-to-noise ratio;

reading parameters for data transmission on the upstream channel from a table, wherein the parameters in the table are associated with the signal-to-noise ratio and the target packet error ratio;

building an Upstream Channel Descriptor message based on the parameters; and

sending the Upstream Channel Descriptor message to the cable modems.

24. A computer readable medium having stored therein instructions for causing a central processing unit to execute the method of Claim 23.

25. The method of Claim 23 wherein the parameters are selected from a group consisting of symbol rate, modulation type, or error correction levels.

26. The method of Claim 23 further comprising:

reconfiguring the cable modems to transmit data according to the parameters.

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